



Two new species of *Sabatieria* Rouville (Nematoda: Comesomatidae) with conical-cylindrical tails, from Campos Basin, Rio de Janeiro, Brazil*

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* In: Brökeland, W. & George, K.H. (eds) (2009) Deep-sea taxonomy — a contribution to our knowledge of biodiversity. *Zootaxa*, 2096, 1–488.

Abstract

Sabatieria is the most abundant nematode genus on the Campos Basin continental slope. Two new species are described here. *Sabatieria exilis* sp. n. has a small rounded head and a narrow pharynx with a cuticularized anterior end. *Sabatieria fidelis* sp. n. has a short outstretched testis, spicules directed ventrally and shaped like the tip of a dropper, the gubernaculum with a v-shaped cuticularized area in the distal part, short cephalic and somatic setae, and a longer tail.

Key words: Meiofauna, Deep Sea, Benthos, Atlantic Ocean, Taxonomy

Introduction

The genus *Sabatieria* Rouville is differentiated by the features: annulated cuticle or transverse punctations; lateral differentiation of large regular or irregular dots; labial sensilla in an arrangement of 6+6+4; spicules usually enlarged in the proximal portion; and the gubernaculum usually with a dorso-caudal apophysis (rarely with a caudal apophysis). Jensen (1979) revised the family Comesomatidae, updated the dichotomous key proposed by Wieser (1954), and discussed the important morphological features used to identify the genera. Platt (1985) revised *Sabatieria* and established 5 subgroups of species, using as differentiation characteristics the type and distribution of precloacal supplements, characteristics of the gubernaculum and apophyses, the number of turns of the amphideal fovea, and the cephalic setae. He considered 36 species as valid. There are now considered to be 48 valid species, 6 of which were described from Brazil: *S. rota* Gerlach, 1957; *S. supplicans* Gerlach, 1956; *S. bitumen* Botelho *et al.*, 2007; *S. spiculata* Botelho *et al.*, 2007; *S. paraspiculata* Botelho *et al.*, 2007; and *S. rotundicauda* Botelho *et al.*, 2007. The first two species were described from coastal sediments, and the last four from deep-sea sediments (Botelho *et al.* 2007).

The taxonomic position of the Comesomatidae is still debatable. Over the years this family has undergone several modifications. It was first placed in the Chromadorida (Wieser 1954; De Coninck 1965; Gerlach & Riemann 1973; Andrassy 1976; Jensen 1979; Platt 1985) because of the punctate cuticle and spiral amphidial fovea. Afterwards, it was placed in the superfamily Axonolaimoidea (order Monhysterida), especially because of the outstretched ovaries (Lorenzen 1994). De Ley and Blaxter (2004), based on molecular analyses, raised the superfamily Araeolaimoidea to the rank of order. Thus, this recently proposed order belongs to Chromadorida and the class Chromadorea (Abebe *et al.* 2006).

With respect to ecology, *Sabatieria* is most abundant in sandy silts (Tietjen 1976). The group is reported as dominant or subdominant on the slope of the Goban Spur (Vanaverbeke *et al.* 1997) and on the shelf break

of the Gulf of Biscay (Vanreusel *et al.* 1992) in the northeast Atlantic. In other deep-sea regions, this genus is also consistently found off South Carolina (Tietjen 1976), in the Puerto Rico Trench (Tietjen 1989) and in the Indian Ocean (Muthumbi *et al.* 1997).

In the Campos Basin, this genus is dominant in samples taken to date (Fonsêca-Genevois *et al.* 2005) and has been found from 750 to 1950 m depth. In this genus two distinct groups are identified, one with a conical tail and the other with a conico-cylindrical tail.

Material and Methods

Study area: The continental slope of the Campos Basin is adjacent to the continental shelf of the state of Rio de Janeiro, Brazil, between 21° 30' and 23° 30' S (Figure 1). The slope has its lowest limits between 2400 and 3000 m depth. It is covered by fine continental sediment and sand, which is composed mainly of foraminiferans (Soares-Gomes *et al.* 1999).

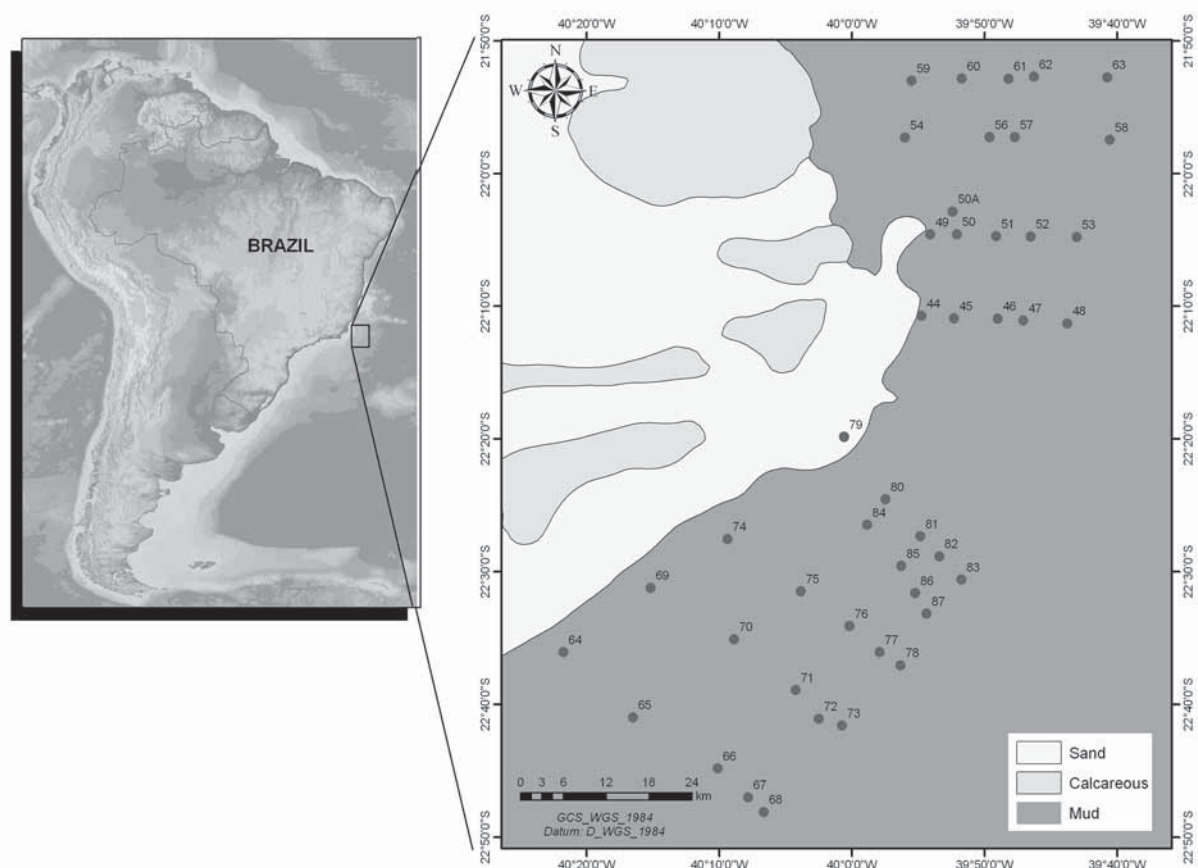


FIGURE 1. Map of Campos Basin.

Samples were collected during the project “Ocean Prof” in Campos Basin, Rio de Janeiro, Brazil, in November and December 2002 and June and July 2003, on board the Research Vessel “Astro Garoupa”. The stations were divided into two regions: North (19 stations) and South (24 stations), at five depths (750, 1050, 1350, 1650 and 1950 m). For the sediment collection, an USNEL SPADE Corer type box corer (Ocean Instruments), with a 0.25 m² surface area divided into 25 cells, was used (Hessler & Jumars 1974). A corer of 2 cm inner diameter was inserted in each cell to a depth of 10 cm for collection of sediment subsamples. Three subsamples from each station were collected, divided into two vertical layers of 0-2 cm and 2-5 cm, stored in plastic containers, and fixed with 4 % formaldehyde-seawater. The nematodes were picked out with a

stainless-steel needle, fixed with 4% formaldehyde and gradually transferred to glycerin (De Grisse 1969). Drawings were made with an OLYMPUS CX 31 optical microscope, with the aid of a drawing tube. Photographs were taken with a C-5050ZOOM Olympus digital camera.

The holotype and female paratype are deposited in the National Museum of Rio de Janeiro (MNRJ), Brazil. The paratypes are deposited in the Laboratório de Meiofauna, Departamento de Zoologia, Universidade Federal de Pernambuco (LMZOO-UFPE), Brazil.

All measurements are in micrometers. All curves are measured along the cord.

Abbreviations used in the text:

- a, b, c: ratios of de Man (1880)
- a: body length divided by maximum body diameter;
- b: body length divided by pharyngeal length;
- c: body length divided by tail length;
- A%: amphid diameter as a percentage of the corresponding body diameter;
- abd: anal body diameter;
- amph wid: width of amphidial fovea;
- cbd amph: corresponding body diameter at level of amphid;
- apoph: apophysis cord length;
- at: number of turns of amphidial fovea;
- bulb d: pharyngeal bulb diameter;
- cbd bulb: corresponding body diameter at bulb level;
- c': tail length divided by body width at level of anus or cloacal opening;
- cbd: corresponding body diameter;
- cbd ex pore: corresponding body diameter at secretory-excretory pore level;
- cbd ner ring: corresponding body diameter at nerve ring level;
- cbd v: corresponding body diameter at vulva level;
- cs: length of cephalic setae;
- ex pore: position of secretory-excretory pore from the anterior;
- gub: gubernaculum length;
- hd: head diameter at the level of the cephalic setae;
- L: body length;
- M: maximum body diameter;
- ner ring: distance of the nerve ring from the anterior end;
- ph: pharynx length;
- suppl: number of precloacal supplements;
- spic: spicule length measured along the cord;
- spic/abd: spicule length divided by the anal body diameter
- s term: terminal setae;
- som s: length of somatic setae;
- T: tail length;
- V%: position of vulva as a percentage of body length from anterior;
- v: vulva distance from the anterior end.

Taxonomy [after Muthumbi & Vanreusel (2006)]

Araeolaimida De Coninck

Comesomatidae Filipjev

***Sabatieria* Rouville**

The list of valid species is divided by groups of *Sabatieria*, according to Platt (1985), and the recent descriptions of Gourbault & Vincx (1990), Muthumbi *et al.* (1997), Chen & Vincx (1999), Chen & Vincx (2000), Pastor de Ward (2003), Huang & Zhang (2006) and Botelho *et al.* (2007).

Sabatieria praedatrix-group:

S. alata Warwick
S. ancudiana Wieser
S. bitumen Botelho *et al.*
S. conicauda Vitiello
S. coomansi Chen & Vincx
S. demani Bresslau & Stekhoven
S. dodecaspapillata (Kreis)
S. falcifera Wieser
S. flecha Pastor de Ward
S. granifer Wieser
S. heipi Chen & Vincx
S. intermissa Wieser
S. lawsi Platt
S. lucia Muthumbi *et al.*
S. lyonessa Warwick
S. maboyae Gourbault & Vincx
S. parabyssalis Wieser
S. paracupida Wieser & Hopper
S. paradoxa Wieser & Hopper
S. praedatrix De Man
S. paraspiculata Botelho *et al.*
S. sanjosensis Pastor de Ward
S. spiculata Botelho *et al.*
S. stekhoveni Vitiello
S. subrotundicauda Botelho *et al.*
S. triplex Wieser
S. vasicola Vitiello

Sabatieria armata-group:

S. armata Gerlack
S. elongata Jayasree & Warwick
S. longisetosa (Kreis)
S. migrans Jensen & Gerlach
S. supplicans Gerlach

Sabatieria pulchra-group:

S. breviseta Stekhoven
S. mortenseni (Ditlevsen)
S. propisinna Vitiello
S. pulchra (Schneider)
S. punctata (Kreis)

Sabatieria celtica-group:

S. celtica Southern
S. furcillata Wieser
S. kelletti Platt
S. pisinna Vitiello
S. strigosa Lorenzen

Sabatieria ornata-group:

S. abyssalis (Filipjev)
S. longispinosa Lorenzen
S. macramphis Lorenzen

S. ornata (Ditlevsen)
S. stenocephalus Huang & Zhang

Species incertae sedis:

S. antarctica Cobb doubtful by Wieser
S. arctica (Allgén) doubtful by Platt
S. arcuata Wieser doubtful by Platt
S. aspera Sergeeva *inquirendae* by Platt
S. australis Allgén doubtful by Platt
S. cettensis Rouville doubtful by Filipjev and Wieser
S. cleopatris Micoletzky doubtful by Platt
S. effilata Stekhoven *inquirendae* by Platt
S. filicaudata Allgén doubtful by Wieser
S. heterospiculum Allgén doubtful by Platt
S. heterura (Cobb) *nec* Wieser doubtful by Platt
S. jubata Cobb doubtful by Platt
S. kolaensis (Ssaweljev) doubtful by Platt
S. mawsoni Wieser doubtful by Platt
S. norwegica Allgén *incertae sedis* by Wieser doubtful by Platt
S. paravulgaris Filipjev doubtful by Platt
S. pellucida Allgén doubtful by Platt
S. possjetica Platonova *inquirendae* by Platt
S. praebosporica Sergeeva *inquirendae* by Platt
S. quadripapillata Filipjev *inquirendae* by Platt
S. rota Gerlach *inquirendae* Platt
S. rotundicauda Allgén doubtful by Platt
S. taboguillensis (Allgén) doubtful by Wieser and by Platt
S. tenuicaudata (Bastian) doubtful by Wieser and by Platt
S. tenuiseta Allgén *inquirendae* by Jensen and doubtful by Platt
S. tubilaima Allgén *inquirendae* by Jensen and doubtful by Platt
S. wieseri Platt *S. heterura sensu* Wieser nom. nov. (Platt)

Species descriptions and discussion

Sabatieria exilis sp. n. (Figures 2, 3, 4; Table 1)

Material Studied: 4 males, 2 females, 2 juveniles.

Type material: Male holotype, slide MNRJ 318. Female paratype, slide MNRJ 319; 3 male paratypes, slides 90–92 NM LMZOO-UFPE; 1 female paratype, slide 93 NM LMZOO-UFPE; 2 juvenile paratypes, slides 94–95 NM LMZOO-UFPE.

Type locality: Station No. 49 at 750 m depth in silt-clay sediments collected in June 2003. The type station was in the Campos Basin off Rio de Janeiro, Brazil, in silt-clay sediments (see Appendix 1).

Etymology. The Latin name *exilis* = slender, refers to the narrow maximum width of this species.

Description. holotype: Body cylindrical, medium-sized, attenuated at both ends. Cuticle with transverse rows of small dots, lateral differentiation of larger, equally spaced dots. Short somatic setae. Rounded head with anterior sensilla arranged in three crowns: six minute internal labial papillae, six minute external labial papillae and four cephalic setae. Amphidial fovea spiral, with 1.5 turns situated at level of cephalic setae. Buccal cavity minute. Pharynx clavate and gradually expanding in the last third, towards the posterior end but without distinct bulb; the anterior end surrounds the posterior part of stoma, which is weakly cuticularized. Cardia short, pear-shaped. Nerve ring slender, located somewhat anterior to middle of pharynx and anteriorly to secretory-excretory pore. Ventral gland present on posterior end of pharynx and beginning of intestine.

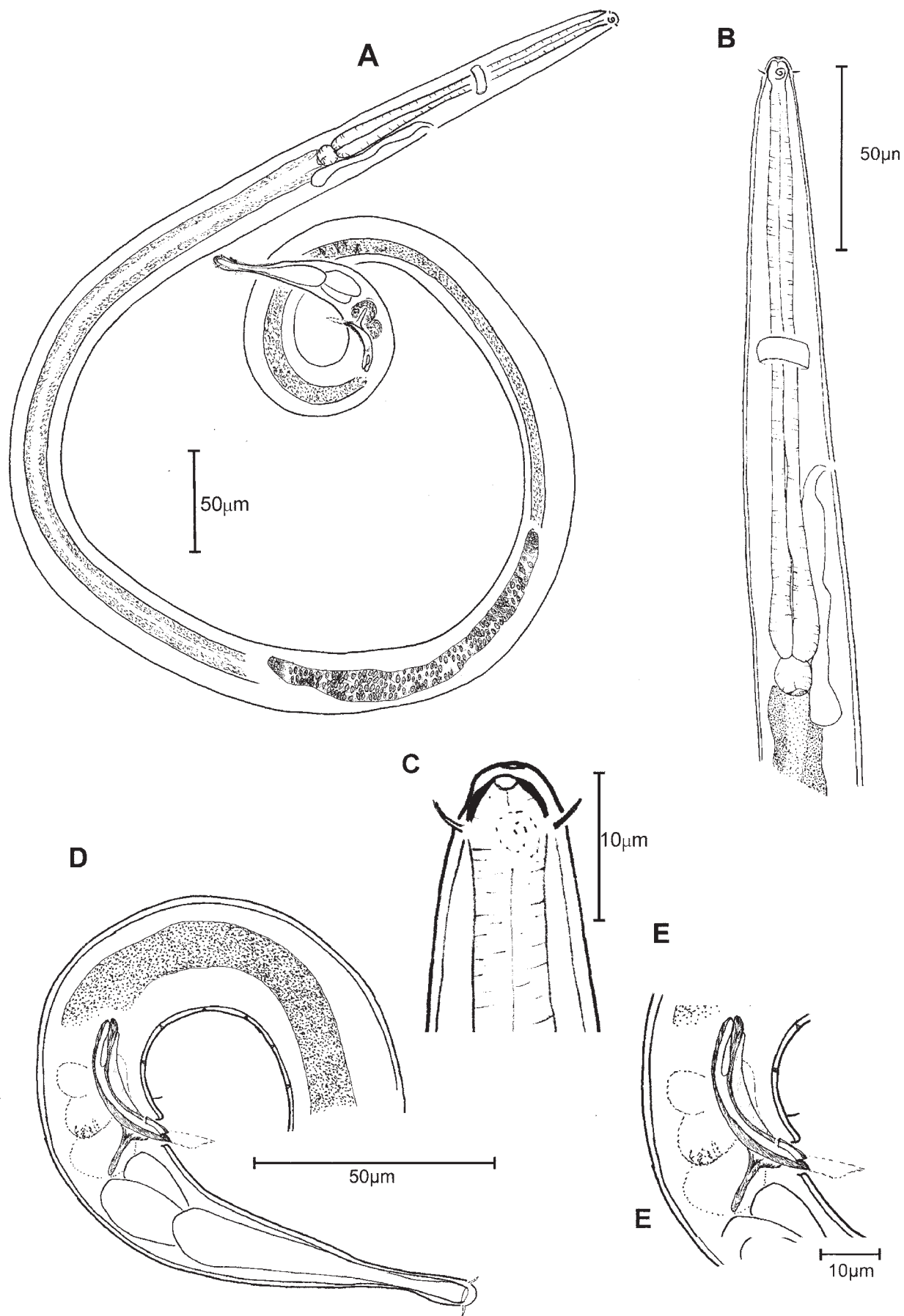


FIGURE 2. *Sabatieria exilis* sp. n. Male. A. Total view; B. Pharyngeal region, C. Head; D. Posterior body region showing the arrangement of preloacal supplements and tail; E. Copulatory apparatus.

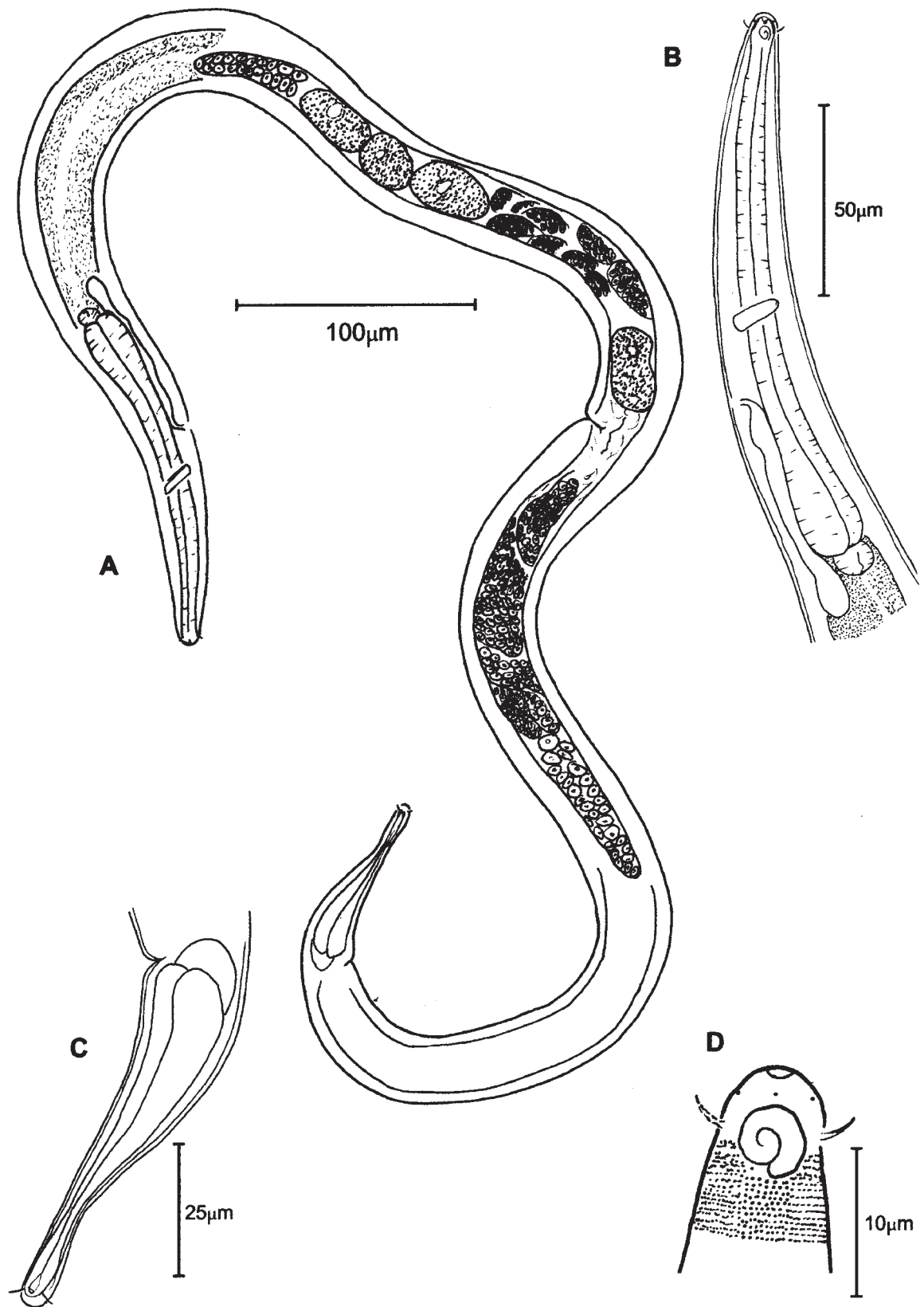


FIGURE 3. *Sabatieria exilis* sp. n. Female. A. Total view; B. Pharyngeal region; C. Tail; D. Head showing cuticle and amphid.

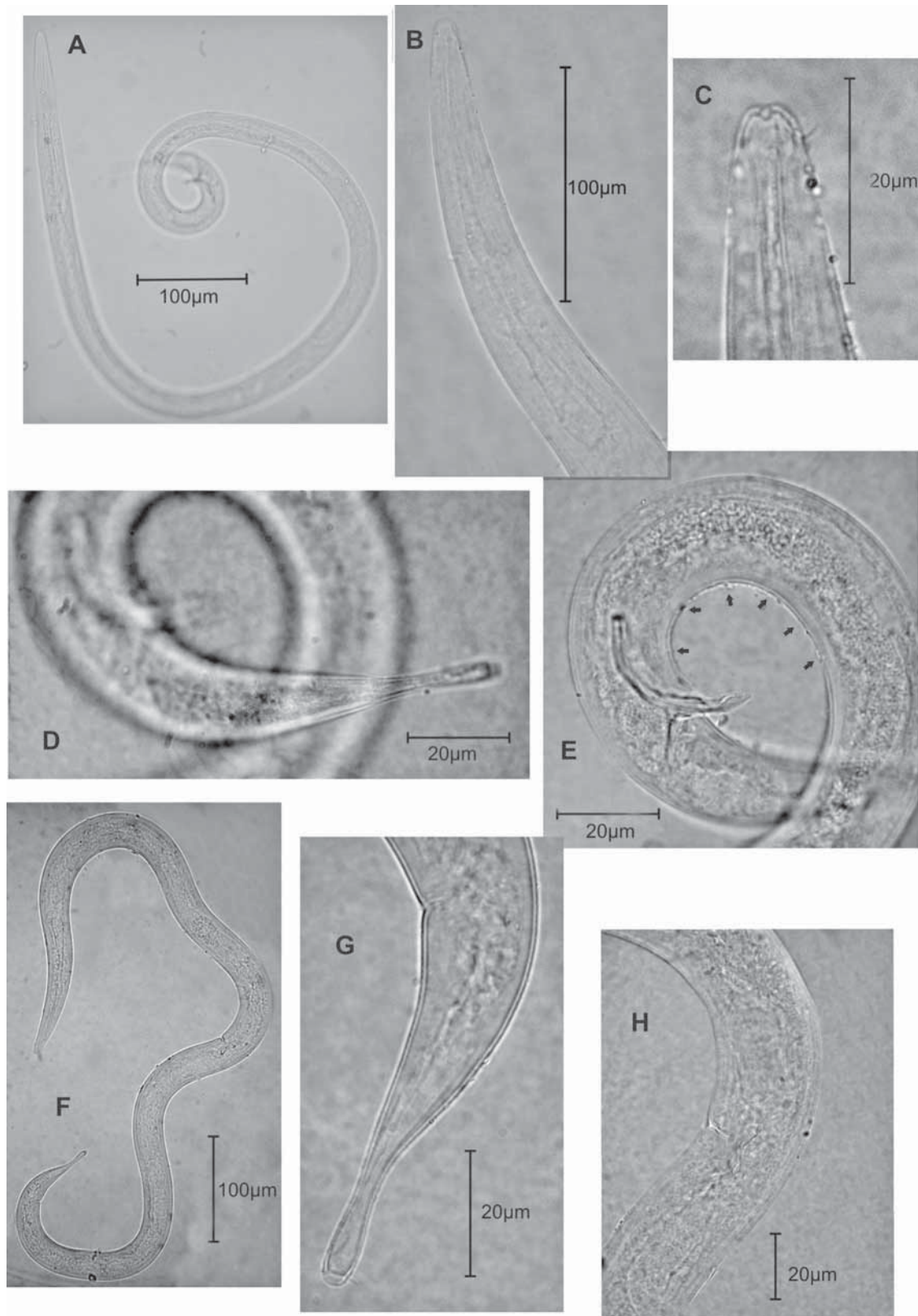


FIGURE 4. *Sabatieria exilis* sp. n. A. Total view of male, B. Pharyngeal region of male, C. Head of male, D. Tail of male, E. Posterior body region showing the arrangement of precloacal supplements and tail of male, F. Total view of female, G. Tail of female, H. vulva region.

Male reproductive system diorchic, with opposed and outstretched short testes. Anterior testis situated on the left, and the posterior testis on the right, side of the intestine. Slender cuticularized paired spicules of equal lengths and widths and slightly curved ventrally; proximal half with mid-septum and presence of alae. Several glandular cells are arranged around the spicules. Small gubernaculum with narrow cuticularized apophysis. Six minute pore-like pre-cloacal supplements, equally distributed; pre-cloacal setae present. Spermatozoa oval, 5 μ m long. Tail conico-cylindrical with swollen tip. Three caudal glands present in postanal region, ending in a spinneret. Two caudal setae, 2.5 μ m long.

TABLE 1. Morphometric measurements of *Sabatieria exilis* sp.nov. and *Sabatieria fidelis* sp. nov.

	<i>S. exilis</i>					<i>S. fidelis</i>			
	Holotype	Allotype	Paratype	Paratype	Paratype	Holotype	Allotype	Paratype	Paratype
	Male	Female	Male= 3	Female	Juvenil= 2	Male	Female	Male	Female
at	1.5	1.5	1.5	1.5	1.3	2.5	2.5	2	3
L	1178	1010	940–1030	970	610–850	1697	1878	2728	1240
ph	162	142	136–146	151	120–135	225	255	255	225
ex pore	86	93	90–100	92	80–95	135	150	135	75
ner ring	70	81	70–84	81	60–82	105	120	not visible	not visible
v	-	533	-	545	-	-	970	-	620
cs	2.5	2.5	2–2.5	1.9	1–2.5	3.7	3.7	3.7	3
amph wid	4	3	3–4	4	4	10.5	11	11	10
hd	8	8	7	8	6–7	14	17	15,5	11
bulb d	13	14	13–15	17	10–14	34	43	40	26
M	26	29	22–29	34	19–25	64	68	79	40
spic	33	-	34–35	-	-	62	-	68	-
gub	7	-	5–7	-	-	16	-	18	-
apoph	10	-	9–11	-	-	22	-	22	-
T	93	77	79	72	64–74	120	90	150	90
cylindrical*	12	10	7–12	6	7–8	13	13	21	16
s term	2.5	2.5–5	2.5–3	2.5	2	3	3	not visible	not visible
som s	2	not visible	not visible	not visible	not visible	3	not visible	not visible	not visible
suppl	6	-	6	-	-	not visible	-	not visible	-
cbd amph	9	8	8	9	8	17	19	17	14
cbd ex pore	23	31	19–22	15	16–23	48	48	56	37
cbd ner ring	19	27	18–20	16	17–21	45	43	54	30
cbd bulb	27	26	24–27	30	19–25	58	54	74	40
cbd v	-	29	-	34	-	-	68	-	41
abd	22	21	19–22	24	15–20	44	48	52	27
V %	-	53	-	56	-	-	52	-	50
a'	45.3	34.8	35–46	28.7	32.7–33.4	26.3	27.6	34.8	31
b'	7.3	7.1	7–7.5	6.4	5–6.3	7.5	7.4	10.9	5.5
c'	12.7	13.2	12–13	13.5	9.5–11.5	14.1	20.9	18.5	13.8
A%	49.4	38.8	39–54	49.4	54	62	56.9	64.3	27.3
c'	4.2	3.7	4	3	4	2.7	1.9	2.9	3.3
spic/abd	1.5	-	1.5–2	-	-	1.4	-	1.3	-

* Length of cylindrical portion in the tail

Female paratype: The females are quite similar to the males, although some minor morphological differences can be observed. Total body length and head diameter similar to males, tail somewhat shorter than male. Reproductive system didelphic, amphidelphic, with outstretched ovaries. Anterior ovary to the left and posterior ovary to the right of intestine. Distal and proximal parts of uterus with oocyte 25–34 µm long. Vagina fine-walled, with dilatory muscle.

Diagnosis. *Sabatieria exilis* sp. n. can be distinguished by the constriction of the pharynx at the level of the cephalic setae, the small uniformly rounded head, the minute buccal cavity, and the number of turns in the amphidial fovea (1.5).

Discussion. *Sabatieria exilis* sp. n. resembles *Sabatieria stekhoveni* in the spicule shape and in possessing a pre-cloacal seta, but can be distinguished from the known species especially by the total length (940–1178 µm in *S. exilis* sp. n. versus 1547–1700 µm in *S. stekhoveni*), number of amphidial fovea turns (1.5 versus 3.25), length of the tail (3–4 versus 4–4.5 cloacal diameter). With *Sabatieria pissina*, *S. exilis* shares the short cephalic setae (2–2.5 in *S. exilis* versus 2.2–2.5 µm in *S. pissina*), small dots on the cuticle, spicule length and shape (33–35 versus 29–31 µm), and apophysis length (9–11 versus 9.7 µm), but can be differentiated from this species by the total length (940–1178 µm in *S. exilis* sp. n. versus 657–777 µm in *S. pissina*), tail length (64–93 µm in *S. exilis* sp. n. versus 50–62 µm in *S. pissina*); number of turns in amphidial fovea (1.5 versus 2.75–3), de Man index a (28.7–46 versus 21.5–27.3) and absence of supplements in *S. pissina*.

In relation to *S. propissina*, this new species is similar in the shape of spicule and its length in relation to the cloacal diameter (1.5–2 in *S. exilis* sp. n. versus 1.3–1.4 in *S. propissina*). The length of the gubernaculum apophysis is also similar (9–11 in *S. exilis* sp. n. versus 10–11 µm in *S. propissina*). They can be distinguished by the total length (940–1178 µm in *S. exilis* sp. n. versus 670–780 µm in *S. propissina*), length of pharynx (136–162 µm in *S. exilis* sp. n. versus 110–118 µm in *S. propissina*) and cephalic diameter (7–8 µm in *S. exilis* sp. n. versus 5.8–6 µm in *S. propissina*).

***Sabatieria fidelis* sp. n. (Figures 5, 6, 7, 8; Table 1)**

Material Studied: 2 males, 2 females.

Type material: Male holotype, slide MNRJ 320. Female paratype, slide MNRJ 321; 1 male, slide 96 NM LMZOO-UFPE, 1 female, slide 97 NM LMZOO-UFPE.

Type locality: Male holotype, station no. 54, 750 m depth, collected in May 2002. Other localities: Female paratype, station no. 41, 1222 m depth, collected in May 2002; male paratype, station no. 35, 916 m depth, collected in May 2002; female paratype, station no. 74, 750 m depth, collected in November 2002 (cf. Appendix 1).

Etymology. The species name is the Latin *fidelis* = faithful, because the specimens have all the characteristics that are common to *Sabatieria* species, and the new features are not easy to see.

Description. holotype: Cylindrical body, medium-sized, attenuated at both ends. Cuticle with transverse rows of dots, and lateral differentiation with larger and more widely spaced dots, irregularly arranged. Head slightly set off by constriction in the cephalic setae region, and with anterior sensilla arranged in three crowns: six minute internal labial papillae, six external labial papillae and four cephalic setae. Buccal cavity cup-shaped. Amphidial fovea spiral, with 2 1/4 turns. Pharynx slightly clavate, gradually expanding towards the posterior end, but without distinct bulb. Cardia short and round. Nerve ring slender, located very close to middle of pharynx and anterior to secretory-excretory pore. Cellular body of ventral gland at level of posterior end of pharynx and beginning of intestine, with secretory pore in middle of pharynx. Male reproductive system diorchic, with opposed and outstretched testes. Anterior testis situated on the left and posterior testis on the right side of the intestine. Slender short paired spicules, similar in length and width and slightly curved ventrally; proximal half of septum and distal part with ventrally directed dropper-shaped tip. Several glandular cells are arranged around the spicules. Gubernaculum small, cuticularized, v-shaped in distal part, measuring 16 µm, and with narrow cuticularized apophysis of length 22 µm. Minute pore-like pre-cloacal

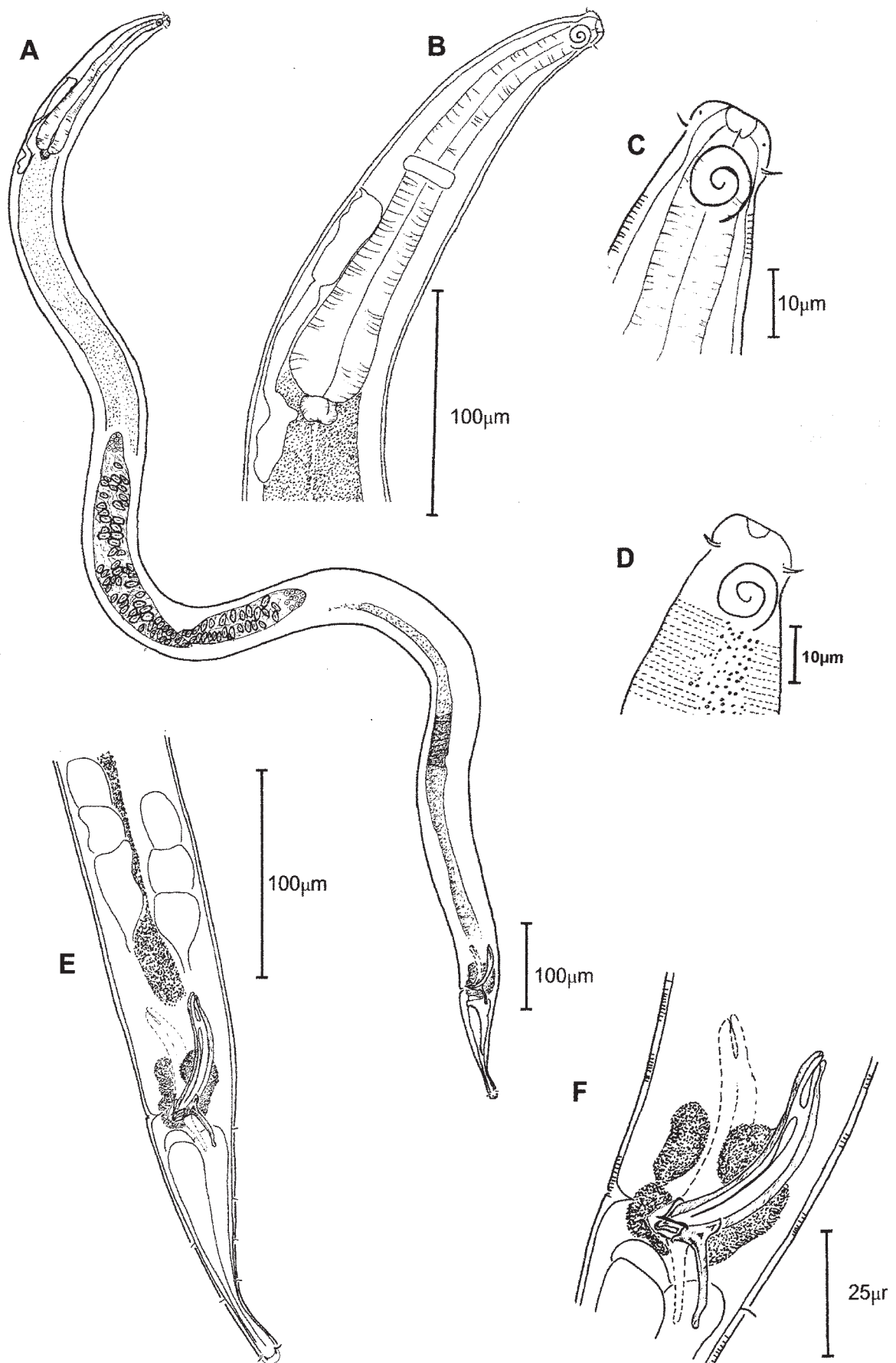


FIGURE 5. *Sabatieria fidelis* sp. n. Male. A. Total view, B. Pharyngeal region, C. Anterior end showing buccal cavity and amphid, D. Anterior end showing cuticle, E. Posterior body region showing the ejaculatory glands and tail, F. Copulatory apparatus.

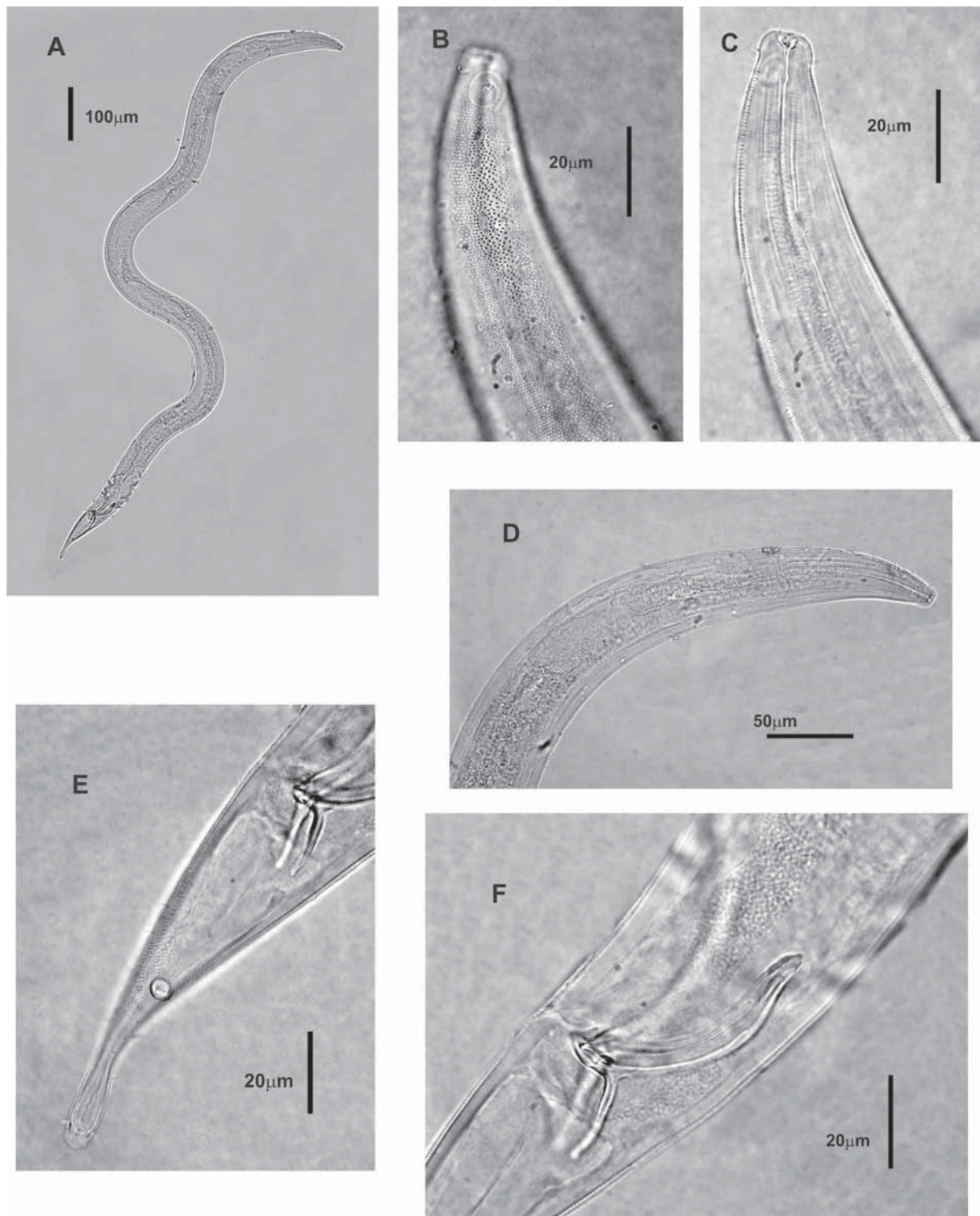


FIGURE 6. *Sabatieria fidelis* sp. n. Male. A. Total view, B. Anterior end showing cuticle and amphid, C. Anterior end showing head and buccal cavity, D. Tail, E. Pharyngeal region, F. Copulatory apparatus.

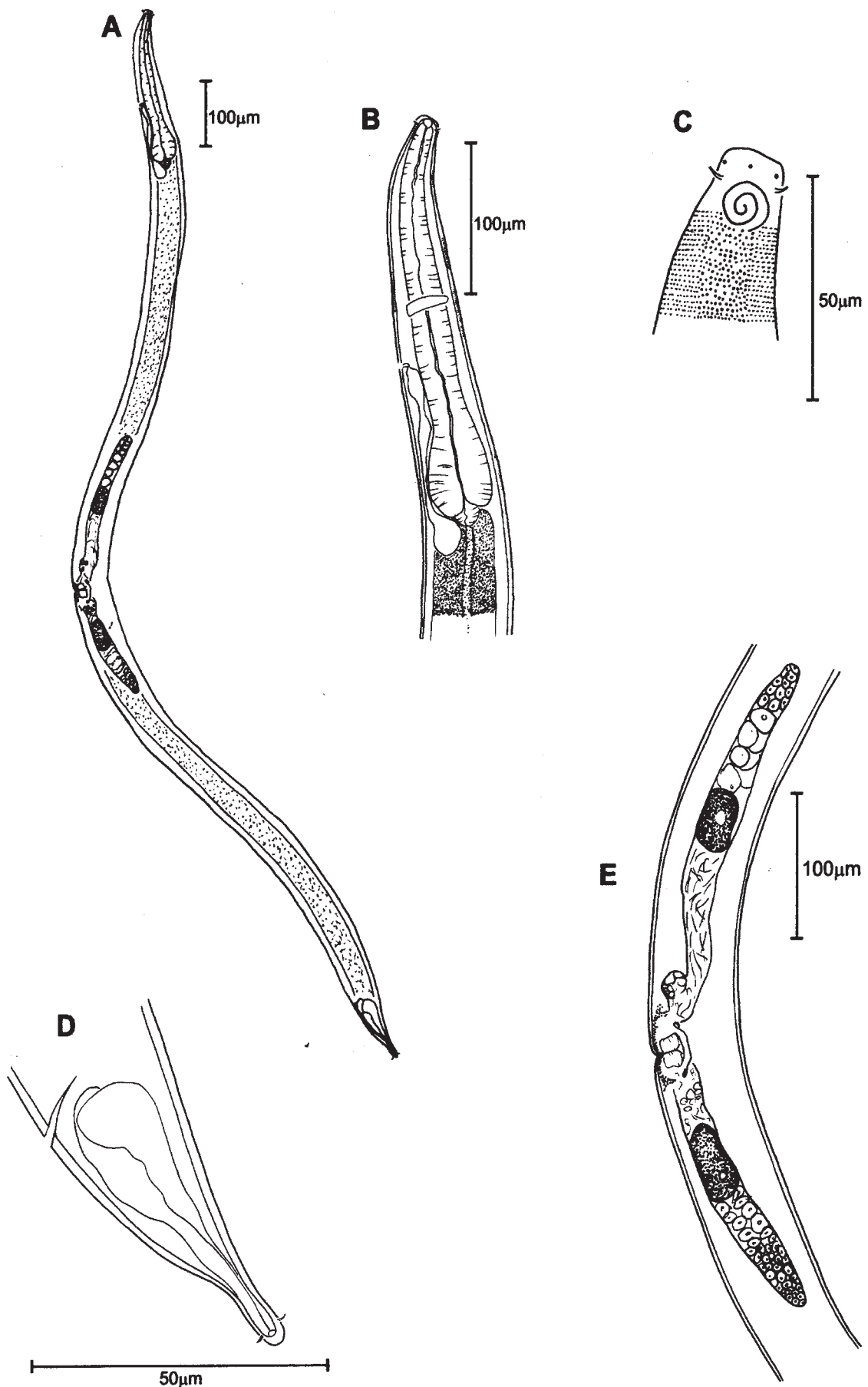


FIGURE 7. *Sabatieria fidelis* sp. n. Female. A. Total view; B. Pharyngeal region; C. Head showing cuticle and amphid; D. Tail; E. Reproductive system.

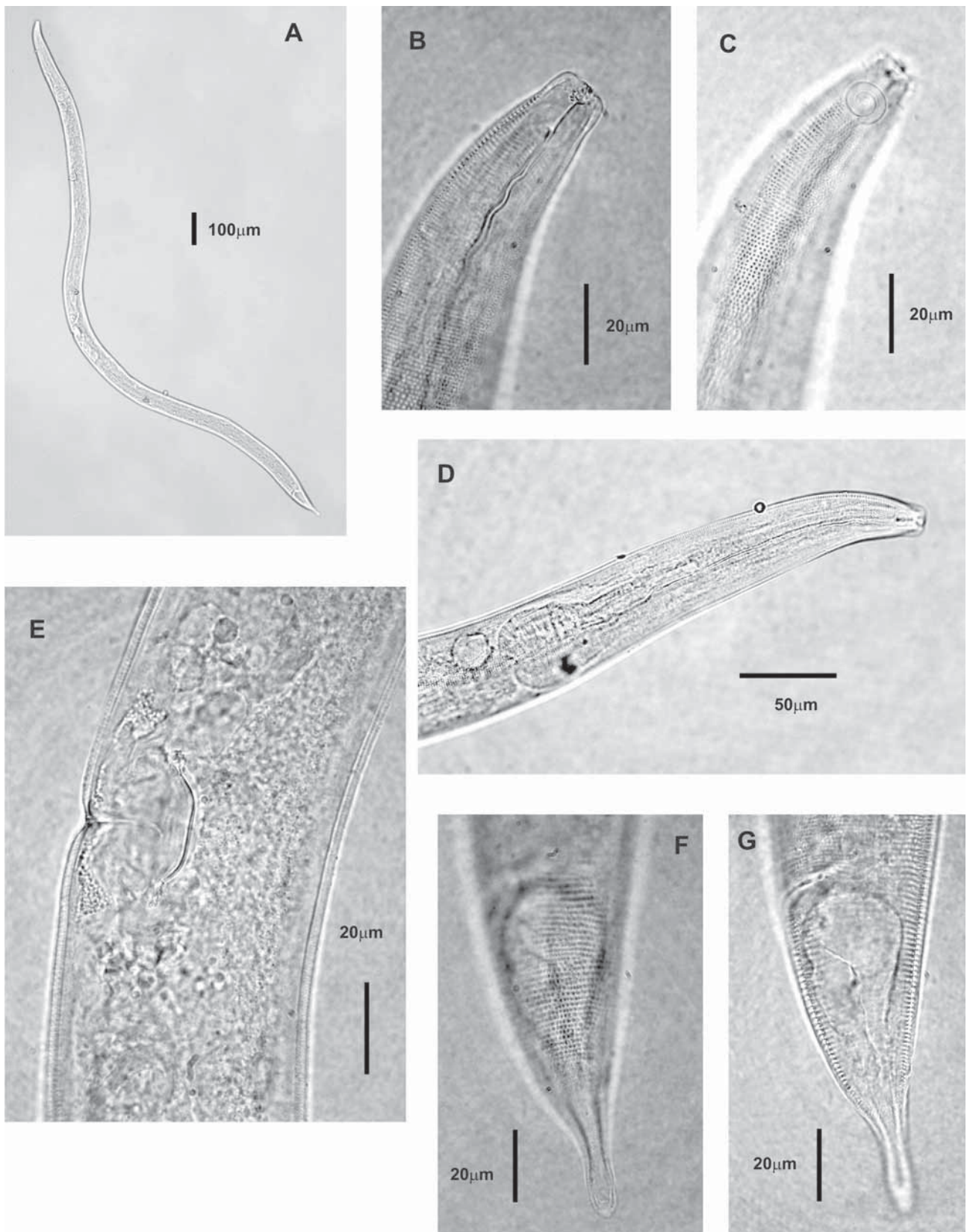


FIGURE 8. *Sabatieria fidelis* sp. n. Female. A. Total view; B. Anterior end showing head and buccal cavity, C. Anterior end showing cuticle and amphid, D. Pharyngeal region, E. Vulva region, F. cuticle on tail region, G. tail.

supplements present, easily overlooked; but unfortunately the specimens are more ventrally positioned without a clear view of the number of them. Three pairs of ejaculatory glands anterior to the cloaca. Spermatozoa oval, 21 µm long. Conico-cylindrical tail with three caudal glands, ending in a spinneret. Three setae on the tail tip, measuring 3 µm.

Female Paratype: The females are similar to males except for the longer total length, shorter tail and spiral amphidial fovea with 2¼–3 turns. Reproductive system didelphic-amphidelphic; with outstretched ovaries. Anterior ovary to the left and posterior ovary to the right of the intestine, and distal part of the uterus with oocyte. Vulva at mid-body, vagina thin-walled; pars proximalis vaginae (= vagina uterina) surrounded by a well-developed constricting muscle. Granular vaginal glands present at the pars distalis vaginae. Oocytes 44–53 µm long.

Diagnosis. *Sabatieria fidelis* sp. n. can be differentiated by its short outstretched testes, the spicules with dropper-shaped tips and directed ventrally, the gubernaculum with a cuticularized v-shape on the distal part, and the short cephalic and somatic setae.

Discussion. In relation to *Sabatieria pulchra*, the similar characteristics are the number of amphidial fovea turns in females, total length, maximum diameter and spicule length. *Sabatieria fidelis* sp. n. differs in relation to the number of turns of the amphidial fovea in males (*Sabatieria pulchra* with 2¾–3), absence of three glands in the pharyngeal region, and the proximal parts of the spicules in *S. pulchra* are more inflated than in *Sabatieria fidelis* sp. n. Another characteristic is the sexual dimorphism in *Sabatieria fidelis* sp. n.: females have a shorter tail and more turns in the amphidial fovea.

Sabatieria fidelis sp. n. is similar to *Sabatieria falcifera* with respect to the short cervical setae, number of turns of the amphidial fovea in the female (2.5 in *S. fidelis* sp. n. and in *S. falcifera*) and spicule length (62 µm in *S. fidelis* sp. n. versus 66.5 µm in *S. falcifera*). It can be distinguished by the cephalic setae length (3–3.7 in *S. fidelis* sp. n. versus 7 µm in *S. falcifera*), length of the gubernaculum apophysis (22 µm in *S. fidelis* sp. n. versus 29 µm *S. falcifera*), number of turns of amphidial fovea in the male (2.5 in *S. fidelis* sp. n. versus 2.7–3 in *S. falcifera*).

Sabatieria fidelis sp. n. also resembles *Sabatieria praedatrix* in maximum diameter (64.5 in *S. fidelis* sp. n. versus 67 µm in *S. praedatrix*) and the length of somatic setae. It can be differentiated by the de Man indexes a and c (a = 26.3–34.8; c = 13.8–20.9 in *S. fidelis* versus a = 50–55; c = 13.5–14 in *S. praedatrix*).

In relation to *Sabatieria vasicola*, this new species has the same values of de Man indexes a, b and c (a = 26.3–34.8; b = 7.4–10.9; c = 13.8–20.9 in *S. fidelis* versus a = 26.6–32.2; b = 7.5–9.3; c = 9.1–14.7 in *S. vasicola*), but can be distinguished by the length of the cephalic setae (3–3.7 µm in *S. fidelis* sp. n. versus 6–8 µm in *S. vasicola*), spicule length (62–68 µm in *S. fidelis* sp. n. versus 72–82 µm in *S. vasicola*), apophysis length (22 µm in *S. fidelis* sp. n. versus 33–34 µm in *S. vasicola*) and tail length (90–150 µm in *S. fidelis* sp. n. versus 173–220 µm in *S. vasicola*).

Acknowledgements

We are grateful to the Brazilian Petroleum Company (PETROBRAS) for financial support that made it possible for a nematode taxonomic project to be included in the Brazilian deep-sea research program in Campos Basin. We also thank Nicole Smol, Ghent University, Belgium, for her help and advice with *Sabatieria* new species and Dr. Janet W. Reid, JWR Associates, for her critical revision of the English text.

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APPENDIX 1. Map with coordinates of stations where *Sabatieria fidelis* and *S. exilis* were found.

